

summer 80

44

# nuance

"...a shade of difference"

NORTHROP UNIVERSITY



### Editor's Note

U-ni-ver-si-ty: From the Latin 'Universitas'  
meaning the whole, universe, society, guild.

#### Webster's New World Dictionary

Traditionally, the scientific mind has scanned the horizon for the ultimate constant, the basic and fundamental laws that explain the order of things, the elemental quarks. There is another side to inquiry with an eye to the multiplicity, diversity, and the unpredictable qualities of the universe. Without limiting itself to either world-view, NUANCE can bring together the scientific specifics with their more general implications, questions, extrapolations, and controversy.

In a spirit of interplay between the worlds of the exact sciences and the less predictable social sciences, NUANCE can explore the multiplicity within the whole society of the University. Reaching out in all directions — from helium aeronauts to nuclear reactor laws, to astro-exploration, NUANCE spans a diversity of world-views . . . believing that a University's boundaries are only as broad as the minds that define it.

**Michelle O'Daniel**



# NUANCE

summer 80

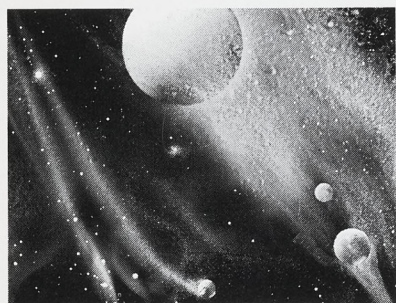
"...a shade of difference"

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**On The Cover:** "Symphony of Space" by Ron Russell, copyright 1978.

Russell's original paintings are produced by hand painting in reverse on the inside of plate glass. The nitrocellulose lacquer is infrared baked and fused to the inside glass surface.

Challenging and inspiring, his paintings allude to what the artist sees as a crucial period in the evolution of man — our natural movement toward the stars. Russells' art anticipates a unique place for itself in the Space Age and the history of art.

## Editors Note

Inside  
Front Cover

## Trustee Forum

The Strub Tradition at Santa Anita

2

## Cosmic Genesis

An Interstellar Inquiry

5

## History of Northrop University

The Founding Years: 1942 — 1949

10

## Yin — Yang of Ballooning

A day at the Gordon Bennett Balloon Race

12

## Alumni Profiles

Kitaw Ejigu: From Ethiopia to Galaxies Unknown  
Mary Wallace Moses: First Woman Graduate

14

15

## Safety Versus Energy

The Damages from Three Mile Island

17

## Alumni News

20

## Campus News

22

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# The Strub Tradition of Santa Anita Sportsmanship



“horse is one of the most beautiful animals that exists and a Thoroughbred is something to behold,” says Robert Strub, President of Santa Anita Operating Company, as he explained in his soft-spoken voice the mystique that draws an average of 28,000 people a day to Santa Anita Racetrack.

Surrounded by the antique jockey scales, the brass weights, the 18th century horse paintings, Robert Strub described the Strub tradition as the business of good sportsmanship. “Last year, he continued, “we had the top handle in the United States, averaging \$4,000,000 a day!”

For fifty years, the Strub family and a nucleus of influential friends, have been building the image of horse racing as a gentlemen's sport. “People think music is an international language,” Mr. Strub smiled, “but the most important people in the world, from Australia to South America to Japan and to Europe are involved in horse racing. It breaks a lot of barriers to have an understanding of what horses they are involved in and what horses you are working with.”

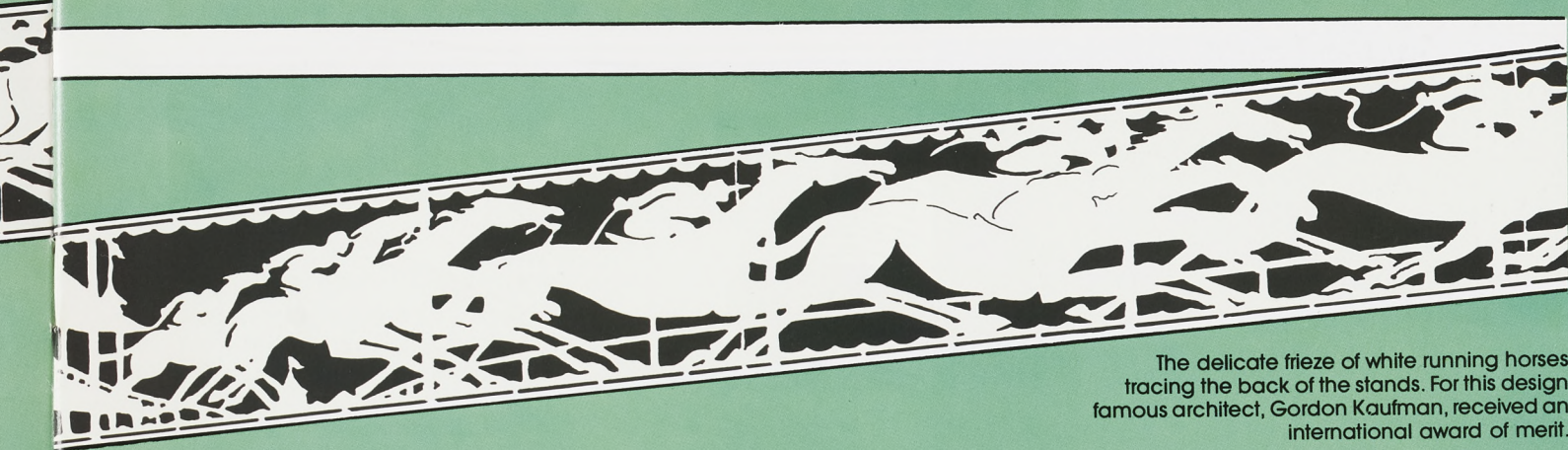
Tan and healthy from his recent Rancheros Ride to Santa Barbara, Robert Strub took time from his fast-paced office routine to explain the business of racing. “I've often thought if our State Department were more alert, they would, ah,” he paused, “they might recognize that racing is more of an entree to top people. If they were more simpatico with some of the things these people liked, they would have more access to their circles.”

There is a familiar ring of truth to what



Robert P. Strub stands beside a portrait of his father, Dr. Charles H. Strub, founder of the Santa Anita Racetrack. Continuing the Strub tradition, Robert Strub has expanded and diversified the holdings of Santa Anita to encompass a realty enterprise and an operating company.





The delicate frieze of white running horses tracing the back of the stands. For this design famous architect, Gordon Kaufman, received an international award of merit.



(right) Robert Strub with Father Virgil Cordono of the Santa Barbara Mission after his blessing to the 800 rancheros before their week-long ride cross country.

(below) Since 1934 thousands of thoroughbreds have thundered their way to fame at Santa Anita. In the 1970's alone more than a dozen horses earned in excess of \$1 million each.

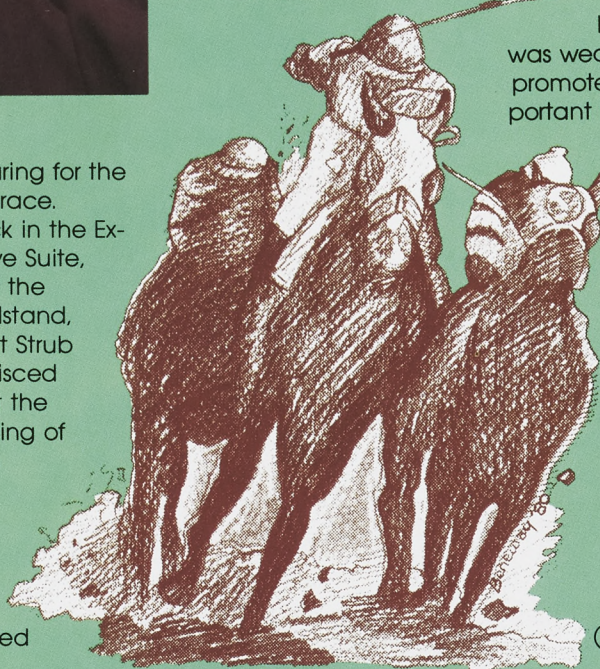
he says since Dr. Charles H. Strub, his father, was presented to Queen Elizabeth, the Duke of Norfolk, members of Parliament and directors of the Jockey Club for his advice as to ways of improving English racing!

Approaching the Santa Anita park through the early morning fog with the art-deco designs of the blue-green 1930's buildings and the acres of flowerbeds, gives the impression you are entering a comfortable country club tradition. Out of the early morning haze comes first the sound of pounding hooves, squeaking leather, and then, that rhythmic blowing of the heavy-breathing horses as they gallop around the track

preparing for the day's race.

Back in the Executive Suite, under the grandstand, Robert Strub reminisced about the founding of Santa Anita. "It al-

ways amazed



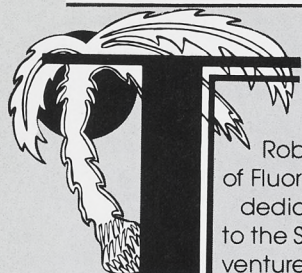
gain the trust of the Horse Racing Board who was weary of fast . . . fly-by-night promoters. "I guess the most important lesson I learned from my

father was the importance of being reliable. His word was his bond and he only associated with people of equal integrity.

Consequently, when Santa Anita Park, otherwise known as the Los Angeles Turf Club, was founded in 1933, it had on its board the President of Standard Oil of California, as well as the Vice-President of the Southern Pacific Railroad."

(continued on next page)





Today, individuals of the caliber of Robert Fluor, President of Fluor Corporation, have dedicated their support to the Santa Anita Racing venture.

"People recognize quality," says Robert Strub, "and it engenders confidence." It wasn't long after his father founded the Los Angeles Turf Club that it became the mecca of the elite from all walks of life.

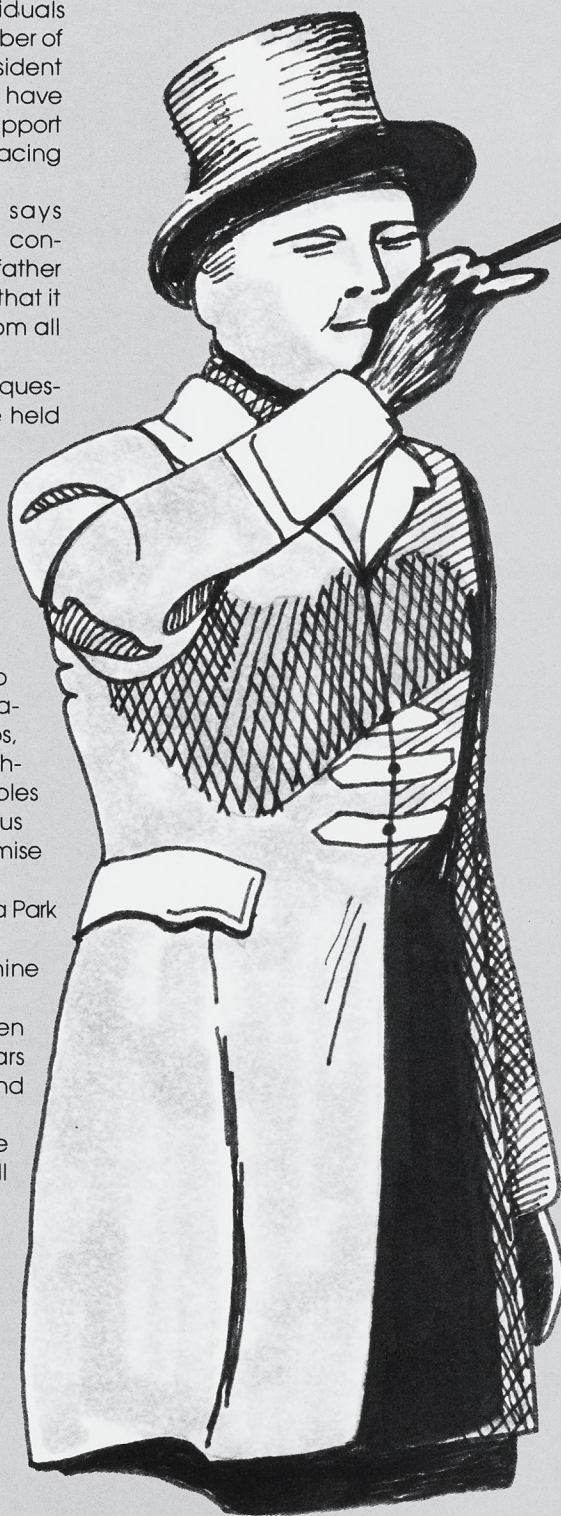
As proof of its fame — the 1984 equestrian event of the Olympics will be held at Santa Anita Park.

The inaugural running of the Santa Anita Handicap was the richest race in the United States and it soon attracted the best Thoroughbreds from practically every great stable in the country. The effect of such high stakes, \$100,000, brought the top horses to Santa Anita railroad station . . . Seabiscuit, Citation, Stagehand, Swaps, The Twister . . . Those sleek Thoroughbreds, flying silks from the best stables and ridden by the most courageous jockeys, were what made the promise of a great race.

Legends were born at Santa Anita Park when Seabiscuit went down dead lame at the wire and returned in nine months to win the Handicap!

Crowd-fever swept to a frenzy when jockey, John Longden, after forty years of racing, predicted his last race and won it by a nose!

In the early morning fog, under the San Gabriel mountains, you can still feel the ghosts of all the greats around the track. Some of the greatest race horses of all time are buried in the paddock under the special Maltese Cross erected by the original Santa Anita Rancher, E.J. 'Lucky' Baldwin, for his champion racers. Bronze statues of Seabiscuit and 'The Iceman,' George Woolf, one of the best all-time jockeys will remain forever as part of the founding spirit of the place. At Santa Anita there is tremendous respect for the tradition as well as the new invention. In its first season, Santa Anita pioneered the photo-finish camera. In 1939, it developed the first magnetic gate so that no horse was caught at the starting post. And yet, to this day, a team of Clydesdales parade out and pull the starting gate into position. A red-coated, top-hatted, and be-medalled trumpeter



still lifts his long golden horn to announce each race.

Today, the race track has grown from Santa Anita Consolidated to the offshoots of Santa Anita Realty Enterprises and Santa Anita Operating Company, both formed in January of 1980. President and Executive Officer, Robert Strub chose to remain in the business of horse

racing, following his father's footsteps

and increase the dimensions of the enterprise.

He has devoted the last five years, in company with many counselors, to the re-organization of the company into two separate businesses.


"The concept has never been done before," he ventured. "We have actually discovered that if we form a real estate investment trust and distribute 95% of the reportable earnings, there will be no corporate tax! (The Santa Anita Fashion Park Shopping Center is part of their diverse investment.) Ordinarily a corporation pays a corporate and state franchise tax combination which results in about a 52% tax. Then, when the dividends are distributed, they also are taxed individually. This has been criticized as double taxation in the corporate world for years," he explained with obvious relief at having solved the impasse.

Modest, and soft-spoken, Robert Strub looks the image of a refined country gentleman in his soft gray-brown suit and occasional burst of dry humor. "You could say my father encouraged me to take part in the business," he smiled.

Robert Strub looks comfortable among the silver trophies in the board room. Actually, though, his father saw that he started out in the Operations Department parking cars, ushering crowds, and taking pictures of the employees for their identification tags.

"I don't take many vacations," he confessed with a sly smile, "but I do ride my Tennessee Walker, Dream, in the Rancheros Ride in Santa Barbara. Eight hundred of us on horse back ride for seven days across the countryside having rodeos and races. It's a change of pace."

In between sentences, Mr. Strub raced from office to office in his fast-gaited walk. "I love this business. Really," he said, "racing in the United States probably has less support than it has in other places of the world, but we have some of the best racing. Knowledgeable people here and in foreign countries have an excitement for and an acceptance of racing. I think its part of our puritanical background which makes us see racing as gambling rather than as informed venture in sports and sportsmanship."

The Strub air of gentility continues. 



Two million years ago, Chicago was buried under a mile of ice. Two billion years ago, there was abundant water on Mars. Now Chicago is sunny and Mars is a red wasteland. Why did these changes occur? How did they happen? Where is the solar system headed? These are the questions astronomers, astrophysicists, and astrochemists attempt to answer in their exploration of space.

## Cosmic Genesis

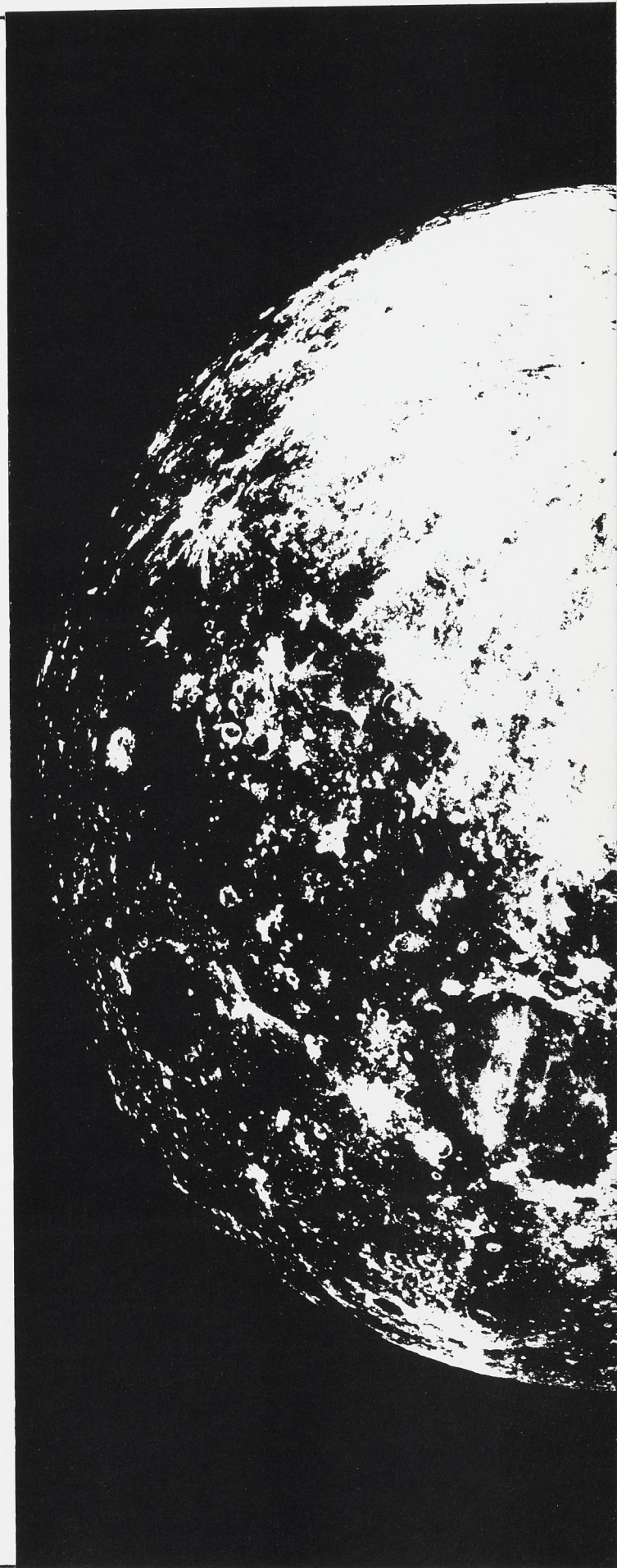
In the beginning . . . one of many beginnings, about 10 billion years ago, the interstellar dust and gases began swirling to form the solar system. Out of hydrogen and silicate dust particles came a planetary system, organic life and eventually a consciousness capable of understanding its own genesis.

Beginning with a stable dust cloud, a whirling motion will start itself. It is a mathematical rule of physics that instability occurs because the atoms and molecules are always moving. When one hits the other, sometimes they exchange energy, sometimes one loses energy to the other, depending on what force they hit. After a while you find some kind of swirling motion in the dust clouds.

The process accelerates as the particles begin to stick together and build up their mass. Once a body becomes sufficiently large, it begins pulling and attracting everything around it. With a high speed, the particles begin falling inward toward the center of the mass creating a high gravitational pressure which, in turn, raises the temperature to a point which may start a nuclear reaction, as in the sun. At 20,000,000 degrees Fahrenheit, nuclear reactions in hydrogen gas begin. When this happens, great energy is released and another star is born.

One beginning leads to another and out of hydrogen gas and silicates came the beginning of the earth with its original atmosphere which was made of water vapor, ammonia and methane gas. There was no oxygen in Earth's atmosphere in the beginning. It took the interaction of volcanic gas and radiation from the sun to first initiate plant life and hence the beginning of photosynthesis and the beginning of the release of oxygen into the atmosphere.

There are still a lot of mysteries surrounding the beginnings of the universe which have yet to be solved. For instance, if all the universe came from hydrogen, where did hydrogen initially come from? Astronomers have observed that the 100 billion galaxies of the universe, with their 100 billion stars, are moving away from us at tremendous speeds, some at millions of miles per hour. The hypothesis is generally accepted that this means the universe is expanding outward from its original center.





From calculations, scientists judge the farthest reaches of the universe to be 20 billion years from the point where they began. Radio telescopes have detected cosmic black-body background radiation coming uniformly from every point in the universe. If you see radiation equally distributed like that, you might suggest that it is the echo of an original explosion, a 'Big Bang', a point where the universe exploded into existence. Until we can otherwise explain the presence of faint radiation coming uniformly from all points of the universe, we will have to accept this theory of the Big Bang as the explanation of the beginning.

Looking into deep space is like looking into a time machine. You can see past as well as the future, depending on which stage of development of a star or planet you explore.

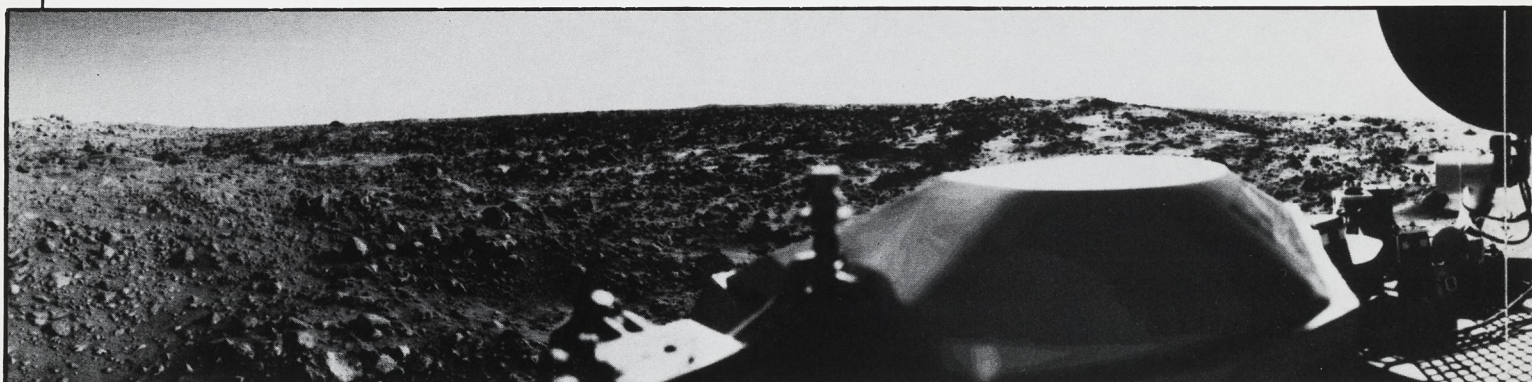
One billion years ago, we know Mars had water abundantly on its surface, which means it had more atmosphere. All that remains today are the desert wastes, dry canals, and polar ice caps which do not evaporate because of the extreme cold at the poles of Mars.

What could have caused such catastrophic changes? Scientists are extremely curious about the comparative climatology of the planets because of the warnings it presents to Earth about the effects of extensive altera-

In 1967, Dr. Mukherjee<sup>1</sup> postulated the existence of an abundance of water on Mars approximately 1 billion years ago. The visible Martian water content was about 4.3 meters deep per square centimeter of the surface area of Mars, compared to 3.1 kilometer depth per square centimeter of Earth's surface. The Mariner mission to Mars verified his theory that since there did exist water vapor which is slowly disappearing, that it is logical for there to have been more water at least a billion years ago.

Studies of the polar ice caps on Mars show six parts of water to one part carbon dioxide. Apparently, there was a water system on Mars. It only remains now to find the organic remnants of life within the soil samples.

Likewise, long before the lunar modules landed on the moon, a team of lunar experts, Dr. Nalin Mukherjee of Northrop University among them, predicted that it would be safe for them to rest on the surface. People thought the moon was made of moon dust and that the astronauts would sink down into the surface like quicksand. Hypothesizing from their experiments with crystalline structures here on Earth, the lunar experts found that when the crystalline structure is damaged due to radiation, the atomic structure becomes active and tries to bond with another particle. Consequently, because the



tions in the chemistry and temperature of the atmosphere.

Any alteration in the ionosphere presents a serious risk to our survival. It was the study of the atmosphere of Venus which prompted an investigation into the effects of aerosol sprays on the ionosphere and led to the discovery that we were breaking down this important shield. On an average day, the Earth is bombarded with 11 cosmic rays per square centimeter per second. These rays destroy the neurons in the brain and are a factor in the aging process. Any additional breakdown in the atmosphere could cause a runaway chain of climatological events on Earth leading to the gradual vaporization of all life forms.

The atmosphere of Mars disappeared because the mass of Mars, only one-tenth of that of Earth, was not great enough to hold an atmosphere. The gravitational escape rate of the atmosphere gradually overcame the gravitational pull of the planet and left it like a desert. Any life forms probably died out slowly as the atmosphere thinned.

Puzzling questions still remain about the many similarities between Mars and Earth. We still do not understand the nature of the high velocity wind storms which approach the speed of sound and distribute a fine red dust high up into the Martian atmosphere. The similarity of the sand dunes on Mars with some of the sand dunes on Earth has frightened more than a few scientists.

lunar maria has been bombarded for millenia without the protection of an atmosphere, the particles of silicates which make up the surface of the moon would be expected to stick together in a firm bonding which is able to take a weight on its surface.

This was proven to be true when Surveyor landed on the moon's crust-like surface, and is still able to stand there to this day.

One of the mysteries of the moon which we were unable to solve is its fluorescence. It is not clear why it is fluorescent.

One of the solvable mysteries of the moon was its origin. It did not come from the Earth's Pacific Basin as popularly believed because the moon was made in the absence of water. After the analysis of the lunar rocks, it was found that the silicates of the moon were anhydrous, formed without water. It wasn't a wandering body which just happened to get caught in the orbit of Earth, since this cannot be proved theoretically. Instead, it looks like the moon was really formed from the material which was around Earth in the form of a dust ring.

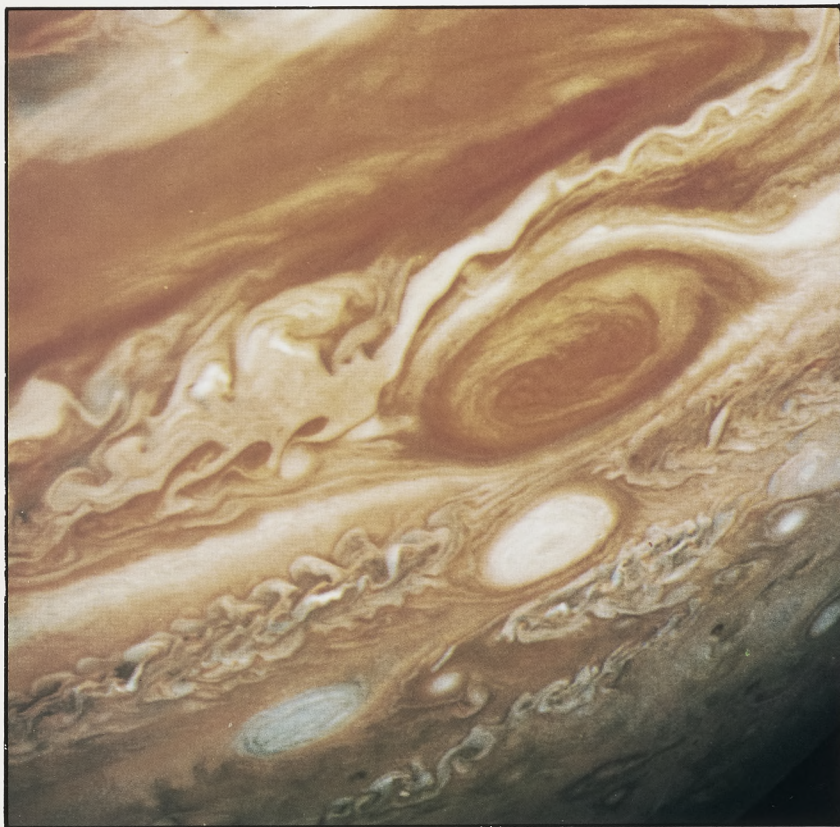
When you have small particles that collide with one another in a hard collision at high velocities, they get hot, melt and stick together. This process does not stop until all the material within its gravitational pull has been used up, amassed into moons.

Shortly after the moon was formed from the particles around the Earth, an era of heavy meteor activity began

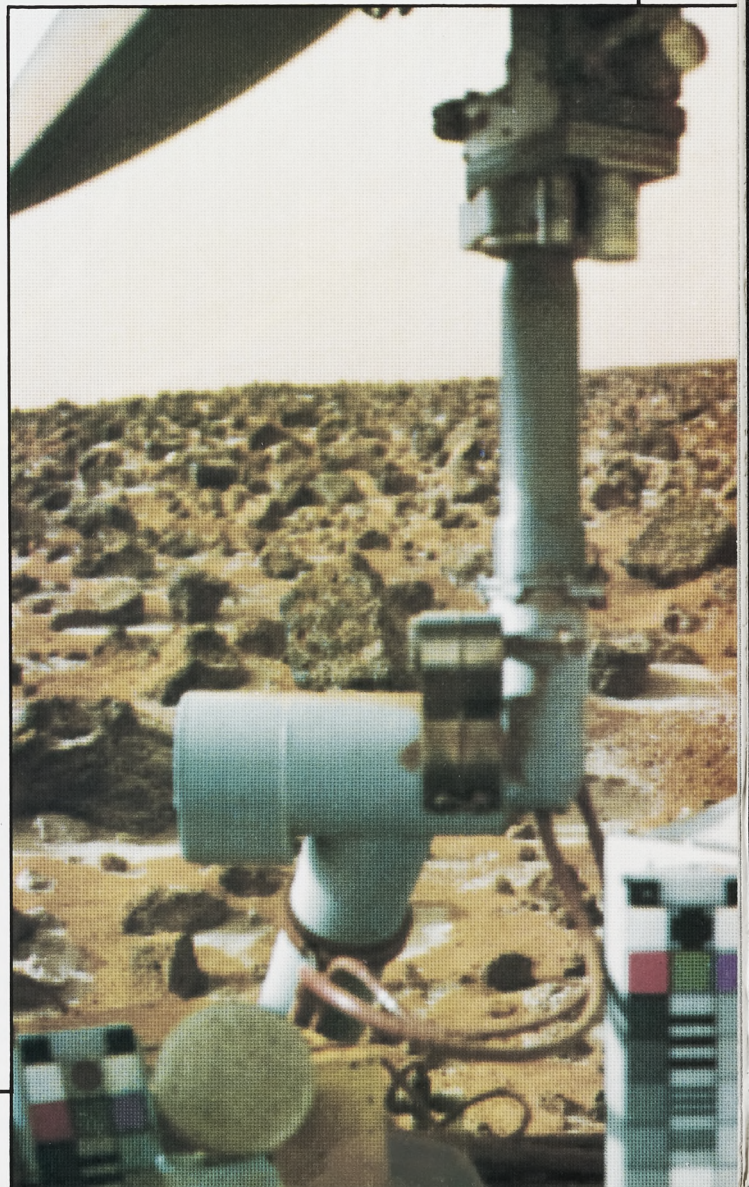




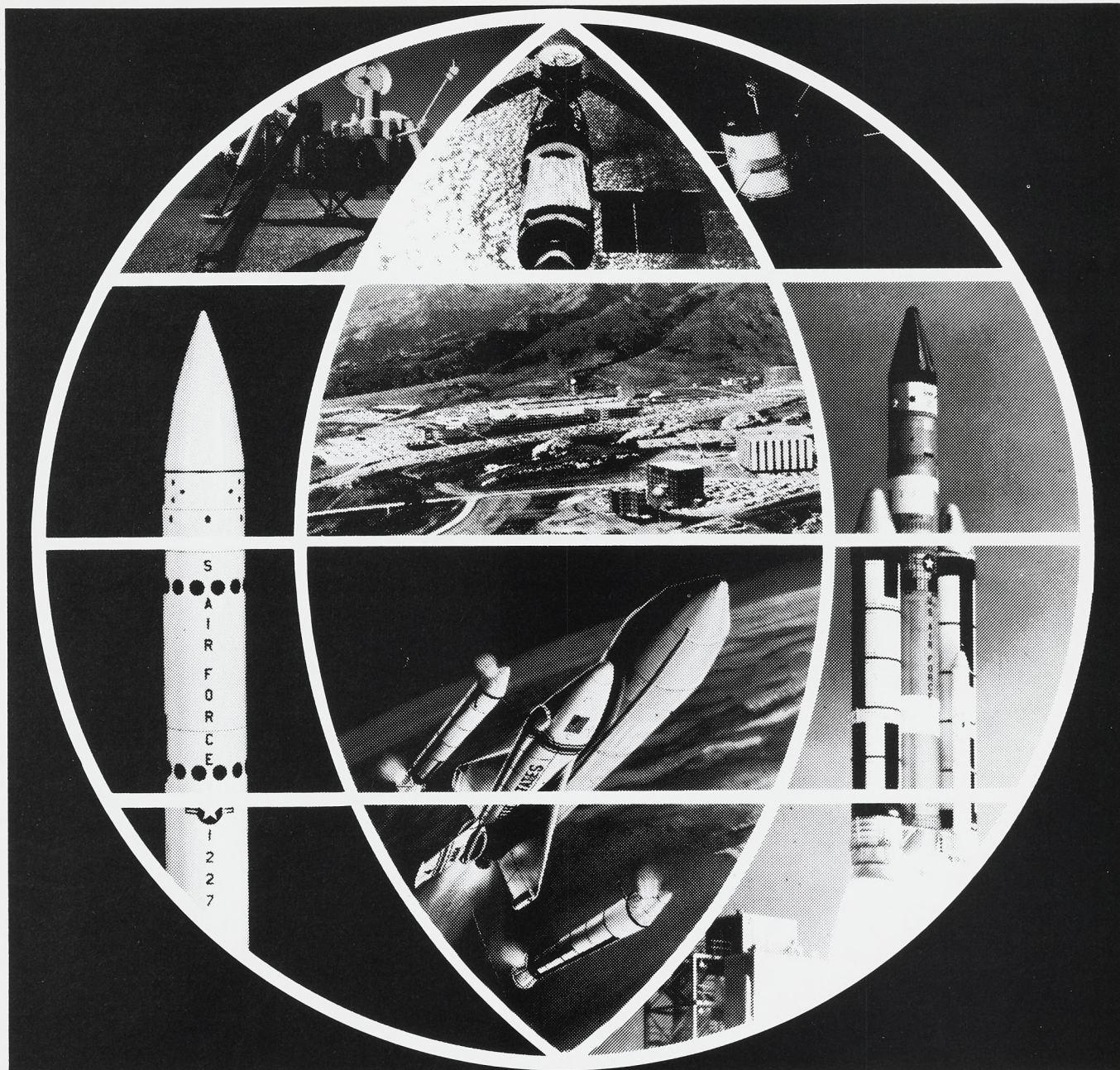
(Opposite page) This is the first panoramic view of the surface of Mars sent back by Viking I in 1976. At left is a collection of fine-grained material reminiscent of sand dunes. (Above) Jupiter and its four planet-size moons, called the Galilean satellites, photographed this year by Voyager I, and assembled into this collage. Jupiter has nine other known moons (Below-Left) From 3 million miles, Voyager 2 shows the cloud vortices and wave structures of the gases around Jupiter in the neighborhood of the Great Red Spot, a giant storm visible for centuries from Earth. (Right) View from Viking lander 2 in 1977 shows late-winter frost on the ground of Mars. The surface is reddish-brown with dark rocks varying from four inches to 30 inches in diameter.



photos: courtesy JPL







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## Cosmic Genesis (continued)

to crater the moon. The craters remain because there is no atmosphere to promote erosion. Earth was showered with meteorites shortly after its formation, but erosion and plant life have covered most of the craters, except the big ones like in Siberia.

One of the more intriguing mysteries which have yet to be solved in the solar system is the origin and behavior of Pluto. It may not even be one of the original planets. Its orbit swings in and out of the orbit of Saturn and then out into the fringe of deep space. We really don't understand anything about Pluto, yet.

The possibility of extraterrestrial life is not such a great impossibility, either. We are probably not the only intelligent beings in the universe, even in our own Milkyway galaxy. Many researchers consider living bodies to be only efficiently organized chemical species consisting of large molecules composed of atoms. Since our earth is not the only planet where favorable circumstances exist for the formation of these molecules, many of the stars even in our own galaxy with similarly situated planets and a similar environment may produce life molecules.

The major stumbling block for man is communication with these other life forms since the distances between the star systems are so great.

As it stands right now, the fastest spacecraft ever to leave the Earth, Voyager I and Voyager II, which will sweep into deep space after photographing Saturn and Uranus this year, are travelling so slowly compared with the vast interstellar spaces that in all the tens of billions of years of future Milky Way Galaxy, they will never reach another planetary star system! They are doomed to wander in the dark interstellar space forever.

In the end . . . the sun will gradually cool and swell into a red giant. Eventually, all the solar system will become a cool, rock-like mass. By then, in another 6 billion years, the necessity of space travel will be synonymous with survival. Unless we have made it to another star system, no one will be around to ask, "Why do we need a space program?"

In order to leave the solar system and reach another in time to transmit messages back to the same people on Earth, the space vehicle would have to travel close to 30 billion centimeters per second, the speed of light. That relatively impossible technological feat would require a great amount of time and energy to develop. But it could mean a new beginning.

'Dr. Nalin Mukherjee, Physical Sciences Professor at Northrop University, was one of the 127 scientists from around the world who were chosen by Douglas Aircraft in 1967 to analyze lunar samples brought to Earth by the Apollo missions. The analyses by Dr. Mukherjee, his associates and other scientists indicated that the formation of the moon resulted from a dust material ring orbiting around Earth.

Dr. Mukherjee was the first person to assert in early 1971 that the residual polar hoods of Mars contained a substantial amount of water ice along with frozen carbon dioxide . . . the south polar hood being primarily composed of water ice and the north polar hood being composed of water ice and a fair amount of carbon dioxide. All of these predictions by Dr. Mukherjee were substantiated by Mariner 9 orbiter in January 1972.

Dr. Mukherjee also predicted that during the late spring and summer, liquid water produced in the advance-retreat region of a polar cap may possibly flow through underground "channels" from the polar region to the lower latitudes. These predictions of underground water flow have yet to be proven.

At present, Dr. Mukherjee is completing work on the lunar atmosphere.



(Above) Europa is the brightest of the Galilean moons around Jupiter with a mantle of ice perhaps 100 kilometer thick. The complex patterns on the surface suggest the icy surface is fractured and that the cracks fill with a dark material from below. (Below) Dr. Mukherjee examines the mysterious light reflected from a lunar rock sample. Any handling of the lunar rocks had to be done with special gloves in a vacuum box.



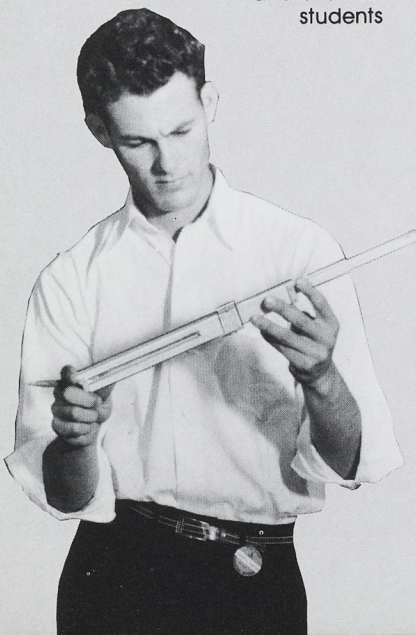


# The Founding Years of Northrop University: 1942 to 1949



Jack Northrop, Aeronautical Pioneer and Co-founder of Northrop University, shown inspecting the testing of the world famous "Flying Wing" in 1947. Heralded as "one of the greatest flying machines the world has ever known", the controversy surrounding its ordered demolition has yet to be publicly explained.

By the year 1949, the student body of Northrop Aeronautical Institute was composed of 410 engineering students and 343 A&P students



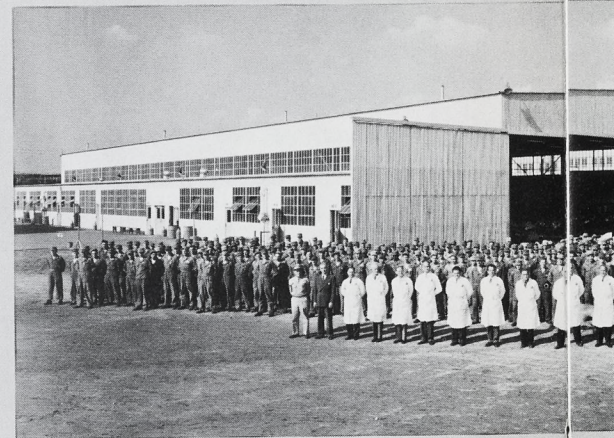
contracted to train military personnel to keep pace with the nation's growing demand for trained aviation specialists.

"It was a round-the-clock operation," explained Melvin Miles, currently an instructor for Northrop University's A & P School. "They were running three full-time shifts a day just to keep up with the growing needs of the military." Over the first several years Melvin estimates that "We turned out thousands of mechanics and aeronautical engineers; we had to. Northrop and the other aircraft manufacturers were turning out fighter bombers off the assembly line at the rate of one every hour. So the production at both ends was frantic. The factory whistle would blow and a plane would roll off the assembly line."

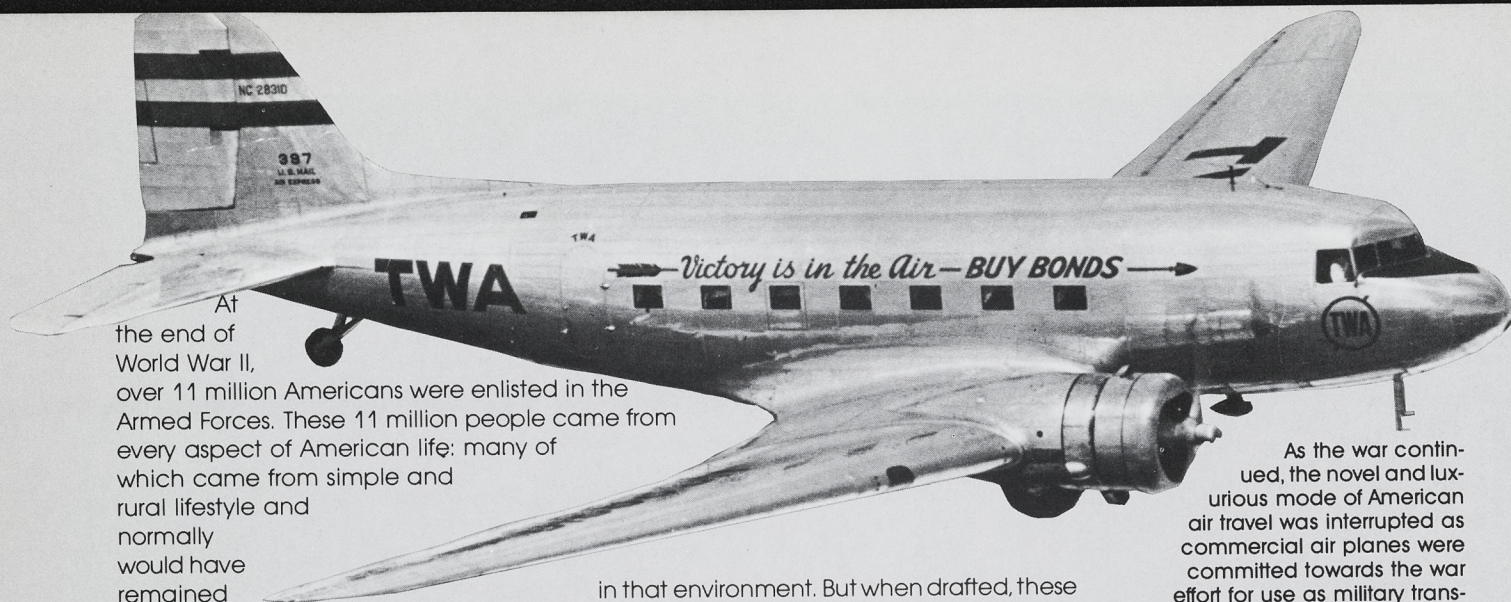
The war affected every aspect of American life: from the amount of sugar that could be eaten right down to the rubber soles on shoes. American housewives could no longer enjoy such luxuries as silk stockings or choice meat on festive occasions — all of which were commodities that were prudently rationed.

Americans made many sacrifices throughout those troubled years. Having been introduced to the convenience and luxury of traveling by aircraft, this novel mode of transportation was interrupted in American life as commercial planes were committed to the war effort, along with the pilots and mechanics who operated and maintained them. Consequently, the aviation shortage was dramatically felt in both civilian and military life.

With the defeat of the German Forces in 1945, the thought of peace was a welcomed relief in the heart of all Americans. The long years of struggle and sacrifice had come to an end and history could close on the most devastating war the world had ever witnessed. It was a time to rebuild the life that once was. But sociologists point out, that re-creation of the old order was never to take place. The thrust of man into what was then considered "high technology" created an air-borne society.







At the end of World War II, over 11 million Americans were enlisted in the Armed Forces. These 11 million people came from every aspect of American life: many of which came from simple and rural lifestyle and normally would have remained

As the war continued, the novel and luxurious mode of American air travel was interrupted as commercial air planes were committed towards the war effort for use as military transports of cargo and personnel. The aviation shortage worsened in both civilian and military life.

in that environment. But when drafted, these individuals were thrust into the 20th century and transported to every conceivable corner of the world. Farm boys from Georgia could easily find themselves stationed in far away places like England, France, the South Pacific and even California! They were soon to discover that time, distance and communication were now within man's immediate reach through the use of air travel. What was once an "adventure" to fly was now a common element of American life. No longer would an impatient traveler "waste" five days traveling by train from Los Angeles to New York when only ten hours of flying made it happen now! And so, the big boom in aviation was re-focused from military support to commercial aviation. Thus... the new push was on.

**"750,000 NEW JOBS . . . Civil Aviation in the U.S. can provide more new jobs in the next ten years according to a recent report of the Civil Aeronautics Administration.**

**The government agency also forecast that more than 400,000 private planes will be in use in the U.S. by 1955."**

**Associated Press  
February . . . 1946**

These predictions proved well-founded as many of the nation's top businessmen soon recognized that the expediency of air transport of goods and merchandise meant bigger profits on the balance sheets.

Additionally, many of the nation's top airlines developed substantially during the war effort. Chicago & Southern, which was later to merge

and be renamed Delta Airlines, developed the North Atlantic air route while under contract with the government to transport military cargo and personnel.

When the war ended, this route proved a natural and was instrumental in the degree of success of that airline. "This type of contract arrangement with the military pushed airline route development ahead 20 years," explained Joe Miles, Director of Northrop University's A & P School.

With the scope of the aviation industry's redefinition towards commercialism Northrop Aeronautical Institute also changed its scope. The Spring Class of 1947 saw the school's first civilian graduating class.

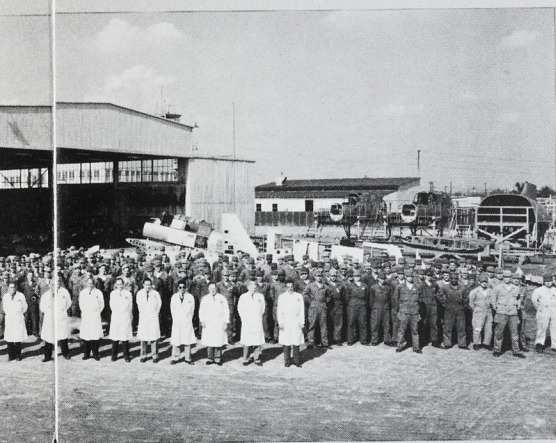
Since the government benefits of the Veteran's Administration proved most generous, Northrop Aeronautical Institute witnessed a dramatic increase in America G.I.'s who wished to continue their aviation

education by enrolling in Northrop's Aeronautical Engineering programs. Additionally, many thousands of veterans were discharged and the need for vocational training and education to prepare them for civilian life affected the school's enrollment with dramatic proportions.

The war had put the world in the air and the founding tradition of Northrop Aeronautical Institute had been established.



With a major thrust into commercial aviation, Northrop Aeronautical Institute produced its first civilian graduating class in 1947.



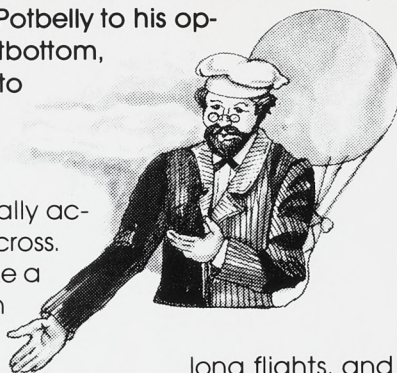
Northrop Aeronautical Institute, originally located in Hawthorne, undertook a number of training and service contracts for the aviation industry as well as the United States Military Services.

Next Issue:  
Northrop University  
1950 to 1959



"I will wager, sir, that I can fly my balloon a farther distance than you can," says the distinguished veteran aeronaut Phineas P. Potbelly to his opponent. "Sir," replies the Honorable Herbert H. Hotbottom, "I accept your challenge and will look forward to seeing your balloon floundering to the earth while I fly sublimely by." And so begins practical competition in the sport of Aerostation.

Forgive me if this example isn't all that historically accurate, but it's close enough to get my point across. Human nature is competitive, and aeronauts take a competitive pride in the distance that they can navigate in their wonderful machines. Some-

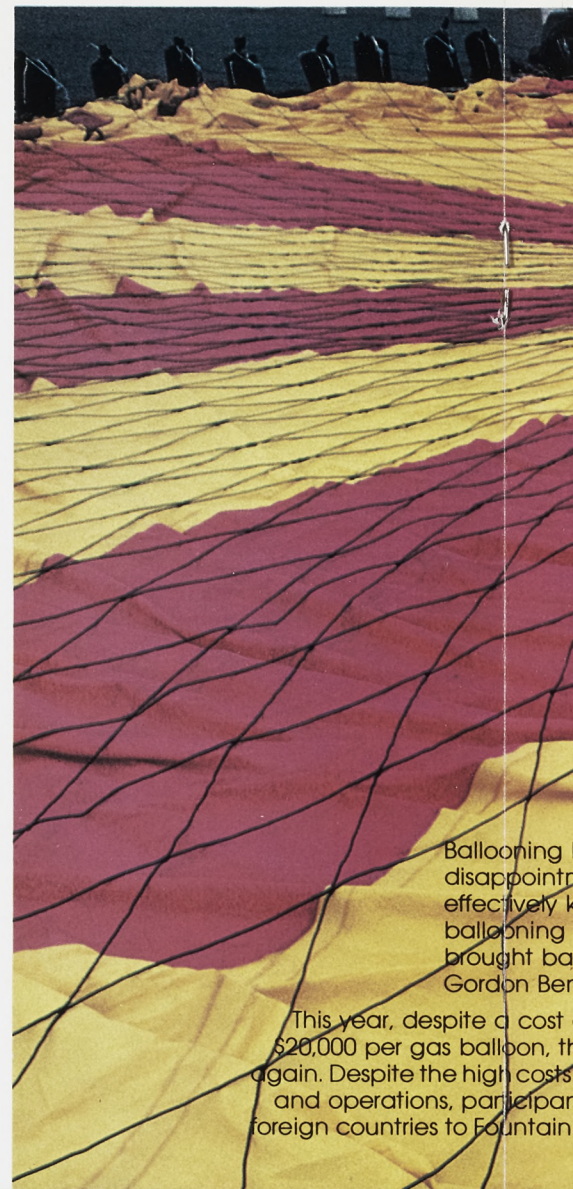


times there are long flights, and other times not. But, whatever the distance flown, it is always a spectacular event full of unimaginable expectation.

The most recent event of this type was the 1980 Gordon Bennett Balloon Race (so named because of some people and events you can best read about in history books, encyclopedias, and old aeronautical journals). This particular event happened in the Mile Square Park in Fountain Valley, California. Twelve balloons, representing six different countries were inflated, manned (or womaned, as the case may be) and launched to achieve their destiny.

What an amazing thing that many hundreds of people, almost all strangers to one another, can come together for one day and accomplish such an awesome task. It's a magnificent example of human cooperation. In my particular niche of this operation I had, perhaps, a better perspective from which to appreciate this, than many others who took part.

My job was to lay the groundwork so that the race would be logistically possible. That means working with good sports to put together gas balloons, aeronauts, sand, helium, permits, security, FAA authorization, and quite a few social events. Bring all these components together at a particular time and you have a big international gas balloon race, namely the Gordon Bennett!



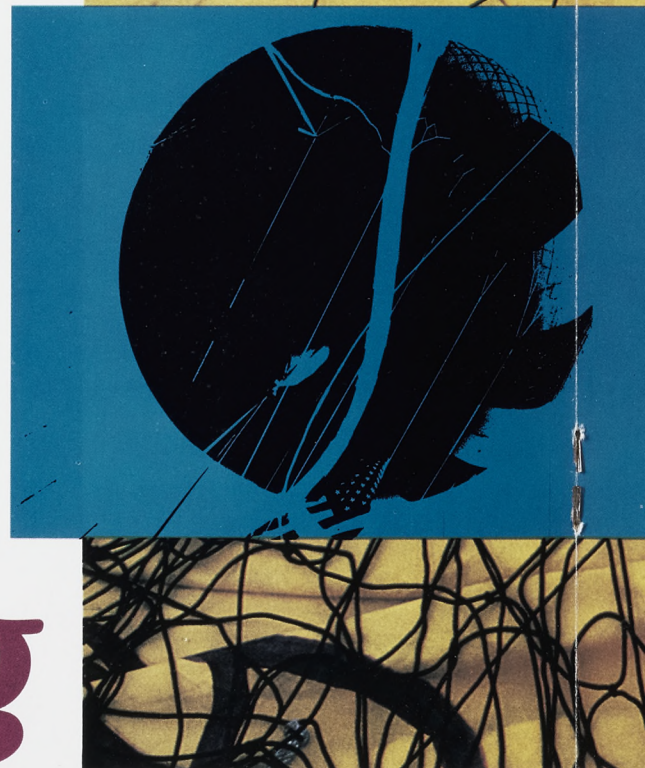
Ballooning disappointed effectively k ballooning brought ba Gordon Ben

This year, despite a cost \$20,000 per gas balloon, th again. Despite the high costs and operations, participan foreign countries to Fountain

# The Yin-Yang of Ballooning

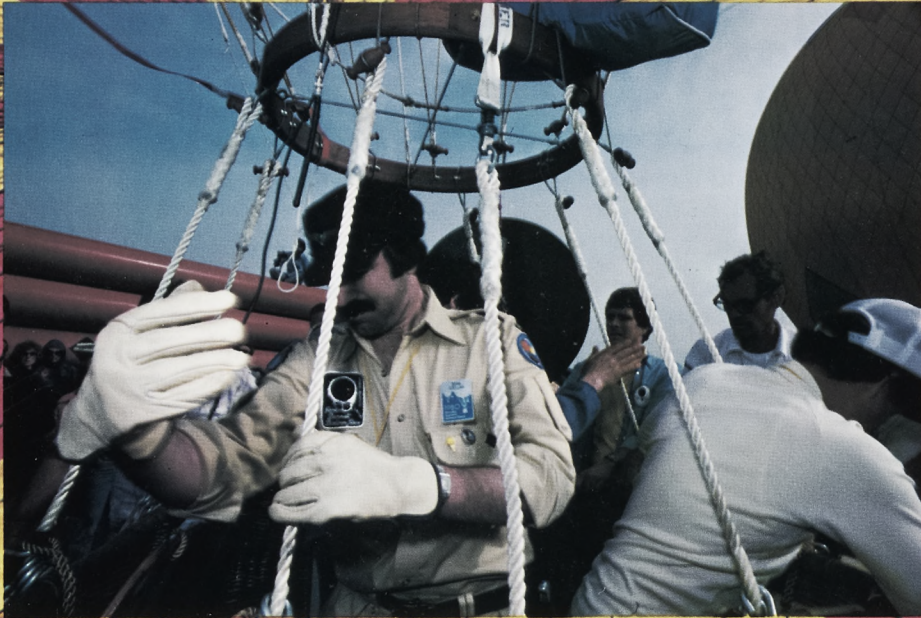
by Will Robertson

When these components were all worked through, a peculiar kind of magic took over. The day of the race and the grounds were inundated with 50,000 people. The balloons started growing like giant mushrooms full of helium. And, all of a sudden the balloons were gone. The job of tracking began and then was over. The results were checked and evaluated. The winners declared. The Survivors Banquet achieved it's function of awards with a high degree of elegance. All that is left are the souvenirs and the memories, memories, memories.



Will Robertson, is a teacher at Northrop University's Institute of Technology.





Ballooning has its ups and downs, its yin and yang, its disappointments and exhilarations. The War in Europe effectively killed the popular competition in international ballooning for 41 years. Only last year was the sport brought back to life in Long Beach, California at the Gordon Bennett Balloon Race.

At a cost of approximately \$100,000 per balloon, the Race went on despite the high costs of transportation. Participants came from six continents to Fountain Valley, California, U.S.A.

At dawn they spread their giant balloon casings on the ground, anchored them with sand bags and ropes, and started pumping the helium. By noon, the little gondolas were trailing off into the clouds under their giant helium-powered, life plastic spheres.

The winning balloon, 'Cloud Dancer,' piloted by the American team of Tepper and Myers landed 24 hours later at a distance of 528 miles.

(One balloon and crew landed in a Baskin Robbins parking lot to the startled glee of ice-cream eaters.)

The trailing balloon from Switzerland went only 6 miles in 4 hours . . . so goes the yin-yang of ballooning.





# It's in the Stars . . . and the Planets

When Kitaw Ejigu left Ethiopia in 1972 to study Industrial Engineering at the University of Hiroshima, he always planned to return to his homeland. Then came the revolution. The Communists blocked Ethiopia from the West and Kitaw was cut off from his family and country overnight.

"After the revolution, when I was studying at Northrop University I had to go to work full-time at night and part-time on the week-ends in order to finish the Aerospace Engineering program," said Kitaw.

But work he did and now, Kitaw is a Design Engineer with NASA's Jet Propulsion Labs in Pasadena. He has just recently been transferred to Systems Design and Engineering where he will be a Project Engineer working directly with the scientists who develop the requirements for the space satellites and probe missions.

He wouldn't be where he is today if a few years ago he didn't see the need of additional training in management and business.

"Today's engineering demands a knowledge of the planning and budget management aspects of the project, especially in the space program where so much depends on the government's allocation of funds," Kitaw explained.

"It was always my ambition to go into a management related career, so after I got my Bachelor of Science degree I decided to go back to Northrop for my Master of Science in Engineering Management with an option in Business Administration," he explained.

One of the most important lessons he learned while in the Management program at Northrop University was the necessity of a creative working environment. "Freedom means that an Engineer has creative control over his input into the solution of a problem. He has an extra incentive to work since he views the project as his own individually to solve with his own drive," Kitaw explained.

It took Kitaw two years to complete his Masters degree even though he took 20 units more than the required number and was working full-time at JPL. "They reimbursed me entirely for my graduate education," he smiled.

Currently, Kitaw is working on the International Solar Polar Mission, a satellite designed to fly above the Earth's ecliptic plane and over the sun . . . something no spacecraft has ever been able to do before.

The Solar Polar satellite will send back information about the geomagnetic storms caused by the Sun as much as 10 days in advance. It will also investigate the Sun's magnetic field which protects the Earth from Cosmic ray bombardment, and it will analyze the interstellar gases.

"We are already working on the design of the 'Galileo', a satellite designed to descend under the cloud-cover of Jupiter to probe the surface and relay the information back to an orbiter satellite," said Kitaw.

His mind must be always in the clouds, because even now Kitaw dreams of intercepting the path of Haley's comet in 1986 to find out what is in its tail. "However," he says, "I feel that Pluto is probably the most fascinating planet to explore. It keeps intercepting Neptune and changing its orbit. I would like to eventually design some mission to the outer planets that fringe deep space."

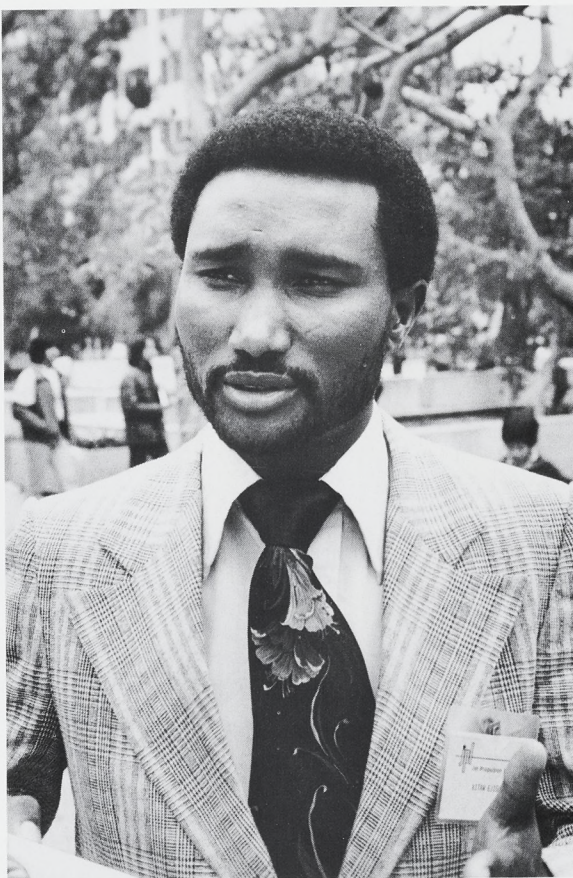
Asked about the way he justifies the necessity of a space program, Kitaw responded, "We shouldn't be confined to Earth just because we have difficulties or disappointments on our home planet. Disappointments in one technology should not keep us

from success in another area. Besides, space exploration has benefited almost every area of modern life with its laser technology and microprocessors."

Less than ten years ago, Kitaw left Ethiopia to study Industrial Engineering, then Aerospace Engineering and finally Management. Today he has worked with Astronaut Buzz Aldren on the Mars Lander and has met Dr. Clyde Tombaugh who discovered the planet Pluto. Does he believe in destiny?

"It's difficult to say . . . whether it was destiny or just plain hard work!"

Apparently his guidance system is intact and operational because Kitaw had the foresight to work hard in the field of the future.



Kitaw Ejigu



## First Woman graduate of Northrop's Institute of Technology Alaska's Outstanding Woman of the Year '75 White House Fellowship Award Winner Wall Street Journal Scholastic Award.

Mary Wallace Moses, the lady behind the headlines, is difficult to find in the tundra of the Arctic. But her achievements have not gone unnoticed. She has chosen to live and contribute to the development of one of the last frontiers where she has worked as engineer, teacher, school administrator, and mother of five children.

"Don't forget," she writes, "that Kivalina is an Eskimo village accessible only by air, snow-machine, or boat. Air-planes are very important to each person here, and everybody needs to know something about how they work."

All in a day's work, Mary must provide fresh water, and make sure the waste is dumped. There is no running water, so she gets up earlier than the others. Then she must make sure there is enough heating oil or wood and that the snow drifts against the house have been cleared. (Last year they were higher than the house.)

She also does her own butchering of the hunt and has learned to like walrus meat, caribou, muskrat, beaver and sometimes lynx. "Whatever is running that season," she explained. "But I still have a little trouble with whale muktuk (blubber)," she added.

After fifteen years of working in the remote regions of Alaska she now understands Upper Koyukon Athapaskan language and is trying to learn Inupiaq (Eskimo) but the classes in aviation science that she teaches are in English.

When she first came down from Alaska at 18 years old to study aircraft maintenance at Northrop's Institute of Technology, she knew she wanted to be an engineer. But after graduating in 1964 with her Bachelor of Science in Aircraft Engineering, and working in Alaska with the Bureau of Indian Affairs building bridges, mapping the Alaskan pipeline, installing electricity, she realized there was a future for her in the education system of Alaska.

"Quite by accident," she recalls, "I was working with the Bureau of Indian Affairs when Peter Three Stars was Tribal Operations Officer. He kept telling me I should

become a teacher."

Mary had already won the Outstanding Service Award by the United States Civil Service for her work in rescuing the stranded Natives during the Flood Disaster of 1967 in Fairbanks, as well as being Alaska's Outstanding Woman of the Year, so when she showed interest in the White House Fellowship program for a Masters Degree in Education, she was chosen from among 2000 contenders.

"It was an added incentive," she explained, "to know that teachers in Alaska make better money than many others and it is often a stepping stone to administration."

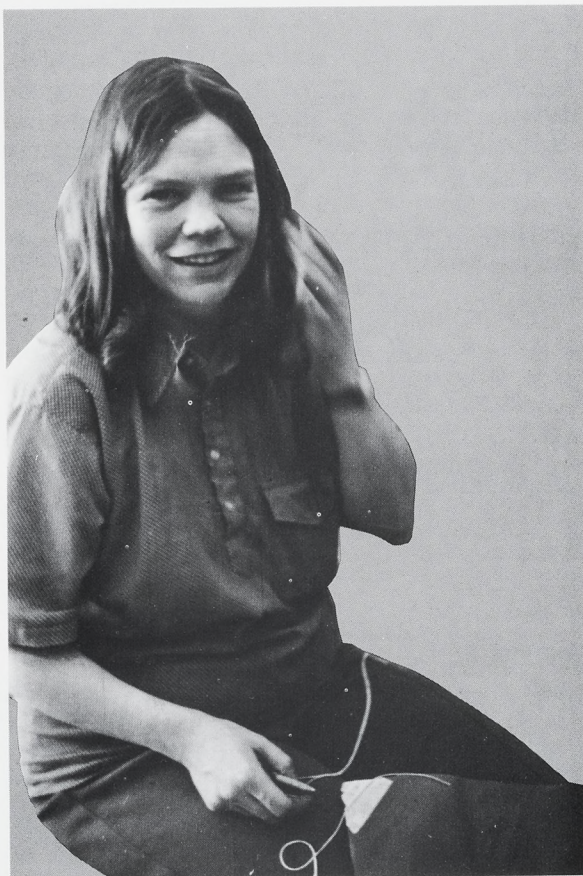
Right now, aside from teaching in Kivalina, she is concentrating on finishing her dissertation for the doctor of Education degree, with specialty in Administration. Her thesis is concerned with the way education has been altered in rural Alaska as a result of cultural transition, by looking at role perceptions of different groups.

Her major concern for Alaskan Natives is that they do not lose their cultural identity as they are forced to change lifestyles by the economic conditions. It is only beginning to become a cash economy in the Arctic regions. The Natives have been used to the barter-exchange system since time immemorial.

But Mary Moses loves the Alaska where she grew up in the isolated regions outside Fairbanks. From her remote whaling village, which is 800

miles from a regular town with medical care, Mary writes: "Engineering education does not preclude a family life for women out here. In fact, it is a necessity for a life which is so dependent on air-travel and the good working conditions of your snow-mobile. You have to be able to repair anything that breaks down along a 600 mile trip."

When the story of Alaska is told, the name Mary Wallace Moses will be mentioned many times as one of those pioneer women who took on family, survival, career and social development all in the spirit of homework.



Mary Wallace Moses



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"Today's advancing technologies demand a more responsibly informed public to be able to make intelligent environmental decisions on issues unique to this century. This award-winning essay by a Northrop University Law Student documents critical aspects of the problems generated by the new technologies. The essay is to be applauded as part of the essential broadening of nuclear understanding to disciplines outside the limited technical community."

Dr. Everett T. Welmiers  
Dean of Engineering  
Northrop University

## Damages From Three Mile Island:

# Safety Versus Energy

by Carol Ford Benson

### The Fires of Knowledge

The known benefits of nuclear power cannot be considered in the absence of its known adverse effects upon human and environmental health and safety. The decision as to how much risk is acceptable in exchange for the benefits cannot be made by the experts; it must be a decision reached through public consensus.

"The Atomic Age began at exactly 5:30 Mountain War Time on the morning of July 16, 1945, on a stretch of semi-desert land about fifty miles from Alamogordo, New Mexico.

"At that great moment in history, ranking with the moment in the long ago when man first put fire to work for him and started on his march to civilization, the vast energy locked within the hearts of the atoms of matter was released for the first time in a burst of flame such as had never before been seen on this planet."

The New York Times (1)  
Sept. 26, 1945

**B**orn as a weapon of destruction, atomic energy poses ubiquitous, lethal threats to systems with which it comes into contact. Under certain conditions, as in core melt, it is even self-destructive. Such is the legacy of the production reactors built during World War II at Hanford, Washington, the super-secret Manhattan Project, the evolution of a new profession, the "nuclear physicist," and of the Atomic Energy Act itself.

Evidence in this article may lead to the conclusion that a third of a century ago, when this nation entered the technological era of commercial atomic power, nuclear proponents accepted greater risks in order to exploit this new energy source than the public might have been willing to accept had the issue been fully debated.

### Definitions

A nuclear incident has been defined as "an occurrence within the United States causing bodily injury, sickness, disease, or death; loss of or damage to property arising out of or resulting from the radioactive, toxic, explosive, or other hazardous properties . . ." 42 U.S.C. 2014 (o)

An accident is more severe than incident. (Consult MIL-STD-882A, U.S. Department of Defense, for authoritative federal guidelines to system safety definitions.)

The President of the United States, a nuclear engineer, in Executive Order 12130, denominated this event an "accident." "In order to provide . . . an independent forum to investigate and explain the recent accident at the nuclear facility at Three Mile

Island in Pennsylvania . . .", the President appointed a Commission to perform a "comprehensive study and investigation," used as one source document for this essay. It is entitled The Report of the President's Commission On The Accident At Three Mile Island.

### What is Safety?

Vocabulary is shaped by culture. Many societies today have no word for "safety". The French and Germans use words more closely related to our "security" and "assurance." In American usage, one does not address the "safety" of the natural environment although the term may be used in relation to a city, an automobile; or a nuclear power plant. Safety expert Willie Hammer uses the word "safety" to describe the benign condition of people, systems, equipment, and products. A barren cityscape, devoid of life, could remain structurally intact — a Pompeii. But, neither a Pompeii nor a Harrisburg, Pennsylvania is "safe" when the inhabitants' life security is compromised.

Popular vocabulary defines safety as what it is not. Safety is no accident. Safety is freedom from risk or harm. Safety is risk-avoidance. Safety is no bad luck!

By deduction, then, absolute safety is unattainable. It would be the condition in which no fastener fails for having been overtorqued. No blemish of human failure due to fatigue, fear, or heart attack is permitted. No nuclear pressure vessel falls short of the fracture toughness and ductility specified by an omniscient design engineer who foresaw every contingency, every transient, every surge of pressure.

"Absolute certainty or 'complete', 'entire' or 'perfect' safety is not required by the Atomic Energy Act, nor does nuclear safety technology admit of such a standard. The public has a right to objective information by which to decide the question of whether nuclear power should be used to generate electricity; to split or fuse the atom for so mundane a purpose, as the President's Commission Report indicates; the Report emphasizes "the public right to public information." (1) (2)

That the public is watchful is revealed by an ABC-Harris survey indicating that following TMI, 43% of respondents said all nuclear plants should be closed "until the Federal Government knows more about the safety risks involved." (3)

The Nuclear Regulatory Commission itself has reported, "Public perception of risk in nuclear power plants is affected by many forces, only one of which is the process of risk estimation and evaluation that is responsive to a regulatory program." (4)

(continued on next page)



## Private Enterprise and Nuclear Power

The Atomic Energy Act of 1946 created the Atomic Energy Commission (AEC), the predecessor federal agency which was responsible for both regulatory and developmental aspects of nuclear energy commercialization.

"The Atomic Energy Act of 1946 was intended primarily to tighten government control over nuclear weapons and to safeguard the American atomic weapons monopoly. The act created a five-man civilian Atomic Energy Commission, . . . The commission was given a virtual monopoly over nuclear technology, and all nuclear-related programs were transferred to it from the military. With one exception, concern for the public health and safety was absent from the 1946 Act. The exception arose from the fear that fissionable material could be diverted . . . However, between 1947, when the act took effect, and 1954, when it was superseded, the commission formally adopted only two minor safety regulations in this area." (3)

"In 1951, the AEC took an important step forward with the establishment of the Industrial Participation Program. Proposals from two sources; a Detroit Edison-Dow Chemical group and the Monsanto Chemical Company . . . resulted in the first industry-government nuclear power liaison. It is proposed that American industry design, construct, and operate one or more atomic power plants with its own capital.

"In May 1952, Dr. Kenneth S. Pitzer, an atomic scientist from the University of California, suggested that slow progress in developing civilian uses of atomic energy stemmed mainly from the cautiousness of individuals working on it. 'I believe,' Pitzer said, 'the change should be to place the technical guidance in the hands of men with real daring and enthusiasm. And one must avoid excessive red tape.'" (5)

Giving the responsibility for regulation and development to a single entity minimized the "excessive red tape." and the enthusiasm would not be treated as injudicious until more than twenty years later.

". . . /Nuclear power obviously raised some serious environmental questions. Some of these had long-range impact (i.e., thermal pollution); other questions were more immediate and dramatic (i.e., the possibility of a major core meltdown.) Because the technology was new and evolving, its unresolved hazards opened it to attack. In addition to pure environmental issues, Americans were growing disillusioned with government involvement in private areas which **was often done in a clandestine manner.** . . . The AEC, historically linked with **military-industrial** cooperation as well as with an increasingly suspect Congressional oversight committee, was a prime example in the eyes of a substantial part of the general public as a regulatory body that was being compromised by the industry it regulated." (6)

"For its part, the AEC let technological change and commercial use move with the dictates of the market. **To compensate for existing uncertainties, the regulatory staff adopted the most conservative design requirements 'consistent with the commercial viability of the nuclear power reactor.'** The staff had no intention of seriously constraining its commercial use. Throughout the 1960's, the AEC's general decision-making principle was to be: "as conservative as possible short of disrupting this commercialization process. As the uncertainties grew, the Commission chose to live with them." (7) Report President Commission TMI

## Whistle-blowing

For many years, the nuclear community evidenced a solidarity of viewpoint, but as the profession enlarged, conflicting professional opinions began to emerge. Eminent scientists could be found in the mainline institutions of industry — AEC — University, and speaking out in alternative forums such as the Union of Concerned Scientists. **Evidence exists which shows the**

nuclear community imposed economic sanctions upon those who questioned it. This seriously limited knowledgeable debate of nuclear questions within the professional community. It also made it difficult for concerned members of the public at large to find reliable technical and scientific answers to their persistent questions.

In 1976, the resignations of three General Electric Company nuclear engineers and one professional employee of the nuclear regulatory agency, in protest over unanswered safety questions, became a public issue. Again, the Joint Committee on Atomic Energy held hearings, these were publicized and given a wide audience on television. The attitude of the governmental and industry nuclear partnership was to question the competency of the three former GE employees, on the grounds that they had recently been converted to a religious sect and were possibly emotionally unstable. But even the publicized hearings of the JCAE did not cause nuclear regulatory agency personnel to change their views toward the importance of safety problem identification and remediation.

In mid-1978, when NRC Regional Inspector James Creswell was requested to investigate the "details of a transient that occurred at the Davis Besse plant on November 29, 1977, he encountered severe resistance within the NRC to his activities. He persisted, "elected to exercise the new 'open door' policy whereby any NRC employee may express safety concerns directly to any superior, . . . had several telephone conversations with NRC Commissioner Bradford and his technical assistants in which he expressed his concern over operator interruption of HPI . . ." (High Pressure Injection pumping of water to assure rapid emergency core cooling, a procedure which had been interrupted and manually overridden by the operators at TMI, resulting in a near loss of coolant accident). ". . . Commissioners Bradford and Ahearne met with Creswell in Washington, D.C. on March 21, 1979, to discuss Creswell's concern about the operator's manual override of HPI. **Seven days later, the accident at TMI occurred. . .**" (6) **Had Creswell's concerns been acted upon, this source suggests the valve failure at TMI would not have escalated to a near loss of coolant accident.**

In 1979 the Congress legislatively admonished NRC not to discharge or discriminate against employees for whistleblowing.

Documented whistleblowing incidents and agency retaliation may present a microcosm of the pressures within the nuclear community for conformity, **for a silence about aspects of nuclear power generation which nuclear professionals consider too sensitive to permit candid reporting.** An employee of Gibbs & Hill, nuclear constructors, is bluntly critical, saying, "the industry consistently projected a rose-tinted view of nuclear power as failsafe, cheap, reliable, ecological, etc., never attempted to deal rationally with the public, (which is) justifiably skeptical of the nuke claims." (8)

In the 1960's and 1970's, the questions of risk and cost were repeatedly addressed in the courts. The public was claiming its democratic right to participate in decision making.

## The Old Order Yields

"By 1974, public skepticism regarding the AEC's ability to regulate in the public's interest set the stage for the AEC's dissolution. (9) This was accomplished by amendments to the Atomic Energy Act in 1974.

## The Nuclear Giant

A nuclear power plant is mammoth. The behemoth does not move; it sits, stolid in its immovable confidence, born of size and power, humming at a decibel level disproportionate to its power, the force it generates speaking softly, hidden under five-foot thick concrete and steel-webbed walls.

Whether at Savannah River, South Carolina or San Onofre, California, nuclear plants are sited away from major concentrations of population. The remote setting requirements were a



decision of the AEC, which seems still wise in retrospect, even though the original impetus may have been from motivations for secrecy that were a carryover from defense sensitivity surrounding the Los Alamos/Manhattan Projects.

The scale of any electrical power generating plant dwarfs the human being, but in hydroelectric generating stations, the roar is deafening and entirely appropriate. The silence of a nuclear plant, coupled with the ever-present knowledge that the system exceeds man's biological-immune systems, exceeds his inherent detection systems, and can be insidiously lethal, has a psychological effect noted by many of the sources used for this report.

Some experts believe that a cause of a significant number of nuclear power plant incidents is that the senses are dulled by a combination of factors, representing a stress syndrome. (10) The human system cannot perform natural detection, deflection, or correction of nuclear power systems problems; it must rely upon mechanical, electrical and optical signals from inanimate systems for intelligible data as to the state of this nuclear giant. Only the dials and gauges: the amber, green or red and white indicator lights and audible signals of klaxons, beepers or loudspeakers communicate to the human operators.

Human factors have been studied very little in connection with the operation of nuclear power plants. Operators for the most part are not systems people. Safety management expert C.O. Miller states some are extremely well qualified while others are not. Many are graduates of the "nuclear navy," where procedures and extreme discipline were valued more than original design and layout to assure safe operation of nuclear powered submarines. (11) **Some suggest that there is possibility that psychologically, operator reflexes become dulled by an overdose of stress.** There is a further reality; those who would worry about continued or high possible periodic exposure to radiological hazards do not take jobs in nuclear power plants. (12)

System safety analysis will permit in-depth exploration of the human factors aspects of nuclear power plant failures. Does the isolation, insulation, and boredom affect capacity to reason and judge? Are reaction times slowed? Does unspoken fear of a meltdown invoke the psychological reaction of battlefield fatigue?

## March 28, 1979: A Clear and Present Danger

The accident at Three Mile Island began March 28, 1979. It is still continuing, the first occurrence denominated "accident" which has run for over a year.

The operators at TMI did not realize the systems implications of what was happening. Apparently they felt it was indicator misinformation instead of system failure, at the beginning. This should not have surprised investigators. The Lewis Committee had predicted that from half to eighty-five per cent of the hypothetical safety system failures of nuclear accidents would be caused by human operators. (13)

"We talked to the operators when that transient hit them, and they did not stop to think and rationalize," the commission wrote. "They worked in a mechanical fashion from what they learned in the plant operating procedures." (14)

## Perspectives

Nuclear physicist Hans Albrecht Bethe observes that the sort of accident that everybody agrees must be avoided at all costs is the one that disrupts the cooling system — the system that keeps the reactor core at a safe temperature. In the light-water power reactors being used today, the cooling system keeps water circulating around the fuel rods. If the flow of water is interrupted and nothing replaces it, the core will melt, and in certain circumstances, **the melting could lead to a release of radioactivity from the containment building.** (15) **Just such an accident was thirty to forty minutes from occurring at Three Mile**

**Island.** But the operators at TMI did not recognize for more than two hours that they were dealing with a potential **loss of coolant accident (LOCA).**

Two technicians were in the control room when the first alarm sounded. One said later "I would have liked to have thrown away the alarm panel. It wasn't giving us any useful information." (16) Many criticisms were lodged against the design which had over one hundred warning lights and audible devices shattering the silence. The "safety" warnings proved counter-productive to clear thinking.

People seem unwilling to accept the risk which nuclear physicists have said they must. As Nobel laureate Bethe has said, "one cannot make a reactor safe without having reactors and gaining experience with them. . . . One can put in many sorts of safety measures, and this has been done, but one must find out what happens in the real world. There one has to expect some incidents, some anomolous occurrences, and indeed some accidents. There are hundreds of occurrences every year." (17)

Many people seem reluctant to accept unknown risks as the cost of learning more about nuclear power.

## The Legacy of TMI-2

Hopefully, the legacy of Three Mile Island will be a change of course, to cure the crisis of public confidence and loss of industry complacency. Perhaps psychologists and physicists, biologists and engineers, statisticians and theoreticians, liminologists and lawyers will begin to communicate with one another through building's windows, instead of walling themselves off from practitioners of non-nuclear disciplines and from the public at large, who may not understand nuclear questions, but have every right, and indeed a responsibility, to discuss them.

In this democracy, public policy is to be determined by all, not by a privileged few. This is the meaning of the universal franchise.

"No elite group of experts, no matter how broadly constituted, has the ability to make an objective and valid determination with respect to what benefits people want and what risks people are willing to assume in order to have the benefits." (18)

Among the beneficial outcomes of TMI could be a significant increase in the depth and breadth of understanding accorded these complex systems, not only by the public, but within the courts.

On the less optimistic side, we may anticipate a veritable curve of bureaucratic energy, spewing less and less effective, more and more costly fixes and requirements into the regulatory atmosphere. Many say the United States, has possibly already lost its technological lead in industrial applications of atomic power, as the backlash of partially informed opinion heightens the success of intervenors, and reduces utilities' interest in undertaking new ventures. This nation was founded upon the principle of democracy. Constitution and the Bill of Rights were intended to embody privileges, rights, and immunities which the people felt must be protected. The persistent question has been "who is to balance the relevant factors and ascertain which interest is to prevail?"

First Amendment rights to freedom of speech, including freedom of the press, are basic to the nuclear energy and safety questions considered in this paper. Informed free speech on nuclear power issues has proved difficult to achieve for two reasons. One is the origin of programs which led to the potential commercial application of nuclear power. Its aegis in the secrecy of the U.S. Army Manhattan Project, and its continuing defense and military uses, means that atomic power can never be free of the burden of confidentiality imposed by the national security. The other reason can be traced to understanding the high technology lexicon and sophistication of nuclear physics, and also of nuclear engineering and construction techniques.



## Safety (continued)

An untrained public cannot comprehend in depth the technical questions facing the nuclear scientist, engineer, or manager deciding among feasible alternatives. Members of the professional nuclear community — perhaps unwittingly — have kept knowledge barriers high, by failing to perceive that what was missing in the democratic equation is public exercise of First Amendment Rights. Democracy demands public participation by all sectors, each with a valid perspective, however non-scientific or technologically ignorant it may be.

The question, "What is more important to the nation, environmental safety or nuclear energy?" cannot be answered. It is certain that absent environmental and human health and safety considerations, there is every reason to believe that nuclear power is an uncontroverted good. But we must ask instead, with members of the nuclear community, "How can we optimize human and environmental health and safety while optimizing use and development of nuclear power?" (Dennis v. United States, 341 U.S. 494, 71 S. Ct. 857, 95 L. Ed. 630)

When participants, including the public, balance the equities through consensus, Three Mile Island will have served its function. The failure of the relief valve may become symbolic of the psychological relief valve which released a pent-up cloud of public dismay and the fear of nuclear disaster from a technology which is not yet comprehended by its many users. **nu**

### FOOTNOTES

(1) Laurence, William L. in the New York Times, Sept. 26, 1945, in Bartlett, John Familiar Quotations, Little, Brown and Co. Boston, 1955 (2) Report of President's Commission, op. cit., at p. 57 (3) IEEE Spectrum, Opinions on Nuclear Power, Christiansen, Donald, Ed., November 1979, at p. 29 (4) NUREG/CR-0400, at p. 39 (5) Outline History of Nuclear Regulation and Licensing, op. cit., at p. 108, quoting an interview in U.S. News and World Report, May 9, 1952 (6) Outline History of Nuclear Regulation and Licensing, op. cit., p. 61 (Footnotes omitted) (7) Report of President's Commission, op. cit., at p. 15 (Footnotes omitted) (8) IEEE Spectrum, quoting Gibbs & Hill employee in "Opinions on Nuclear Power," compiled by Christiansen, Donald, November 1979, op. cit. (9) Rolph, E., Nuclear Power and the Public Safety, (1979) at p. 155 quoted in Report of the Office of Chief Counsel on The Nuclear Regulatory Commission to President's Commission on the Accident at Three Mile Island, October 31, 1979. (10) Personal communication, Ernest W. Levens, M.A., C.A.C., Consultant in Industrial Stress Management, Feb. 16, 1980, Marina del Rey, Ca. (11) Personal Communications, C.O. Miller, Pres., System Safety, Inc. Feb. 12, 1980 McLean, Va. (12) Personal Communication, Ernest Levens, op. cit. (13) NUREG/CR 0400 cited in IEEE Spectrum, November 1979, at pg. 62. (14) Sugarman, Nuclear Power and the Public Risk, IEEE Spectrum, November 1979, at p. 59 (15) New Yorker Magazine, op. cit., at p. 61 (16) Report of the President's Commission, at p. 93 (17) The New Yorker Magazine, Profiles, III, Hans Albrecht Bethe, op. cit. (18) Green, H. "Risk-Benefit-Calculus in Safety Determinations," quoted in Rolph, at 101 cited at p. 135.

Carol F. Benson, a student of Northrop University Law School, is a winner in the Environmental Law Essay Contest of the Association of Trial Lawyers of America. She has spent the last fifteen years working on Safety and the Environment and Safety Analysis. The essay printed here represents excerpts from her award winning essay stressing the need to keep the public informed about environmental safety.

## Alumni News

### Alumni Urged to Return Data For Directory

All alumni should have received a request for the essential information required to assure complete data in the new alumni directory tentatively scheduled for release in early 1981. We sincerely hope that everyone has replied.

Publication of the directory will be handled by Bernard C. Harris Publishing Company, Inc. of White Plains, New York. This company is the sole authorized agent for the production and marketing of the directory, and assumes all financial obligation, including the compilation, editing, billing, and distribution of the volume and will cover its costs through the sale of advertising and individual book sales to alumni only. This plan will assure the publication of a professionally compiled volume.

During the next several months **ALL ALUMNI WILL BE CONTACTED BY TELEPHONE** for verification of the information to be printed in the directory. At that time, and at that time only, they will be asked if they wish to advertise in the directory or to purchase a copy. The number of directories printed will be based on the number of advance orders received via the phone calls.

Alumni who have not returned their questionnaires and are not reached by telephone by the Harris firm will be listed in the directory with whatever information is currently held in alumni records. If you have not received your questionnaire or you do not wish to appear in the directory, please notify the alumni office immediately.



**A Team** Tony and Tracy Moreno make a married team of Deputy Sheriffs and Law School graduates this December. They both met at the Los Angeles Police Department seven years ago and decided to work together in careers and marriage.

Tracy works as a Bailiff in the L.A. Municipal Court House and Tony works in the Public Service Department. Of course, their immediate goal is to pass the Bar in February of 1981 and then to open their own Law Office specializing in Immigration, Real Estate and contracts, Family Law and Probate. In her spare time, Tracy is also the production editor of Northrop's Law Review.





Carl Pearce, Director of Alumni Association

Over 100 Alumni, Faculty and Staff gathered at the Lobster House in Redondo Beach for an evening with Bill Farr, celebrated journalist, and the newly elected Alumni Board Members.

Carl Pearce, Alumni Director, kicked off the evening by saying how good it was to see Law Alumni meeting Engineering and A&P Alumni in the fun atmosphere of a social evening.

After the hearty dinner of Seafood Newburg, Roast Sirloin of Beef and Fruit Ambrosia, the out-going Alumni President Tony Occhionero was presented with a plaque from the Alumni Association honoring him for his outstanding accomplishments and sincere dedication throughout his two year term.

In his departing speech, Tony expressed his enthusiasm that the younger alumni were taking such an aggressive role in the Alumni Association. "It gives me great pleasure to pass the torch to a young and inspired alum," he smiled. "Perhaps, through this renewed inspiration, both the older and younger alums will recognize the unspoken bond that supports the spirit of the Northrop Family."

Raul Alvarado, the newly elected Alumni President, was not lacking in an energetic response. "We are going to strengthen the Alumni Association by engendering a sense of pride in being around the University. People will probably change their jobs many, many times, but not their Alma Mater," he chided. "Therefore, we are going to build an even stronger sense of commitment and responsibility to our school."

Also present were the newly elected Vice President, Harry Zisko, class of '79 and the Board Secretary, Stanley Albrecht, also class of '79.

The big highlight of the evening was keynote speaker, Bill Farr, celebrated journalist widely recognized for his dramatic impact on the changing of Constitutional Law respective to freedom of the press.

While working for the Herald Examiner, Bill's disclosure of the Manson Trials transcripts over a court-imposed "gag-order" drew world-wide attention as the

## Record Turnout for Alumni Dinner



A WARM WELCOME kicked off the evening as Dr. B.J. Shell introduced the evening's keynote speaker Bill Farr (right) Senior Staff Writer for the Los Angeles Times.

Judge handling the case ordered him to reveal his source or be jailed until he did so.

Excerpting from his experiences, Bill recounted the course of events which led him into such an international spotlight. "You must understand that my entire story begins over 13 years ago when I was writing for the Herald Examiner. At that time, it was only rumored that I was going to publish the story and the Judge presiding over the case called me into his chambers and we discussed all the legal implications that might occur. The Judge understood my position and at that time we were both in agreement that it was within my constitutional right to publish the story." Bill emphasized, "This is a very important point! We were both in total agreement as to how the law was interpreted."

"However," continued Bill, "nine months later, I left the Herald and went to work as Assistant to the District Attorney's Office. At that time the judge changed his mind regarding the law's interpretation and raised the issue as to the constitutionality of my disclosure."

As a result, this entire incident has driven me into several hundred thousand dollars into debt. And since my case is still on the books and to be heard before the United States Supreme Court later this year, I will still incur incredible legal fees."

**CHANGING OF THE GUARD . . .** Outgoing Alumni Board President Tony Occhionero (left) is presented with a Distinguished Alumni Award by newly elected President Raul Alvarado.

Changing the tone to a humorous note, Bill noted, "But you know what the real killer is . . . By law you must provide the Chief Justices with 40 copies of your legal brief and defense arguments with all previously related data. Do you know what my xeroxing bill is for 40 copies of all the legal documents over the last 13 years!"

"You might ask why? What is the point of all this? Why did I go through all this hassle for all these years? My entire point can be explained in a simple statement."

"If I am not allowed to publish the information that I know to be true . . . who loses? The Los Angeles Times will continue to publish over one million copies daily and I'll still receive my paycheck every Friday regardless. If I am not allowed to publish what I believe to be the 'public's right to know' — to question our society and their actions, then you are the losers ladies and gentlemen. It's what I lost my job for . . . what I went to jail for . . . and what I'm hopelessly in debt for. If I don't win — then you lose!"





# The Future of Family Law

## Judge Billy G. Mills

Supervising Judge, Family Law Court  
Los Angeles County Superior Court

The first indication of how important Family Law and the family have become was in 1979 when the President of the United States declared it the Year of the Child. But even better than that, I think the real projection of the future was made by the Presidential announcement and decree, that the decade of 1980 is officially the Decade of the Family.

That's extremely important. That subject, that topic, the Decade of the Family, comes directly from the Family Law Symposium that we had in 1979. That's where we got all our Family Law people, the sharp folks, the mental health specialists, the psychiatrists, the lawyers, judges in Family Law to share information, techniques and projections. We produced papers and Washington found out about them. Washington liked our topic. Washington then, I believe, directly adopted it as the style by which the decade of the 1980's would be described.

I'd like to suggest that the best indication of the direction in which Family Law is headed is in the designation of the latter part of 1980 as the season for the White House Conference on the Family. What they are doing now is conducting a country-wide symposium getting all the people knowledgeable in the field of the family to put together proposals and suggestions as to how we might better improve the family in our country.

As part of the Justice Task Force of the Los Angeles County Committee on the White House Conference of Families, I have worked to present to Washington, the social necessity of not only defending the family, but nourishing and developing it.

In the area of family policy, conditions prevail in our society which can best be described as "benign neglect."

While we have conquered the furthest reaches of space, in regards to families some of the greatest distances we have yet to travel still lie within, and between ourselves.

Since 1955, the rate of divorce in Los Angeles County, and the United States, has doubled. Thirty-eight percent of all families will end in divorce, and 60% of these families have children under the age of 12!

Last year, for the third year in a row, over a million families divorced, involving over 3 1/2 million persons, a number larger than the largest standing army in

the world. If these statistics are to continue, we will have people divorced who were not even married yet! Some people are beginning to see the need to turn the trend around! The Justice Task Force of the Los Angeles County Committee for the White House conference on Families has suggested that since Family Court

is the primary institution that touches the divorcing family, it should be developed and expanded to provide local services of family conciliation, and counseling on domestic violence. A national institute for interdisciplinary training

of judges, attorneys, and mental health professionals should also be provided.

Family fragmentation and damage can best be reduced by preventive services, not just expensive, after the fact court cases and crisis intervention services. **ALL PERSONS PRIOR TO FAMILY FORMATION AND AT CRITICAL LIFE JUNCTURES SHOULD HAVE ACCESS TO TRAINING TO PREPARE FOR THEIR NEW FAMILY ROLES.**

Legislation should be drafted to provide for the development of educational programs at the time of family formation, in schools, and for parents to teach the roles of "spousing" and "parenting." Probably, the hardest thing in the world is to be a parent, and we supply no education previous to this experience!

Family Law has always been the step child of the law and I think that it has a great deal to do with our tradition which says that if anything goes on in a man's family, it is his business and nobody else's. Traditionally people have considered outsiders to be rumor mongers and house-wreckers if they get involved in a man's home life. So that some of the finest lawyers in the state of California, who might have been able to practice some of the finest law have somehow historically and traditionally come to think of themselves as being second-class citizens in the practice of family law. And they have actually begun to think of themselves as engaged in a profession which divides pots and pans. **NOTHING COULD BE FURTHER FROM THE TRUTH.**

Family Law has the responsibility of supporting and nourishing the most basic element of our society. If Washington listens and the law profession is successful in presenting its case, Legislation should be initiated to develop a nationwide system of child care centers for working mothers, which would also serve as "stress centers" for families when the family caretaker needs time-out. Attached to these centers would be other resources that could relieve stress for families.

Child abuse and domestic violence are directly related to economic, psychological and social stress and for this reason, the Justice Task Force of the White House Conference on Families sees as its primary functions to encourage the development of family healing services among individual families and a sensitivity to the family's problems in the community.

This speech was delivered at Northrop University on Law Day, May 1, 1980.



After several months of preparation, Northrop University's Billboard campaign comes into full swing. Titled, "A Degree of Difference" the billboard features — three figures representing A & P, Engineering and Law.

The three models selected for the shoot were Northrop's own Gary Collins (A&P), Timothy Boersma (Engineering) and Renate Steiner.

The full-color board will be situated in two locations. For the first two months the display will be located at



## Billboard Campaign Comes to a Rise!

the border of Los Angeles International Airport and will be seen by travelers northbound on the San Diego Freeway at the Century Blvd. offramp. This major highway artery is an important commuter connection from the south bay beaches inbound to Los Angeles. Additionally, travelers from the San Diego area connect into the Ventura Freeway which carries northbound traffic on to Ventura, Santa Barbara and as far

North as San Francisco.

Phase II of the program calls for Pacific Outdoor Media to remove the display from the original location and place it southbound on the San Diego Freeway at the Inglewood avenue offramp. Located in the vicinity of such cities as Gardena, Lawndale and Hawthorne, this display faces southbound traffic on the most highly traveled freeway in Los Angeles.

According to Cal Trans statistical in-

formation, an approximated 9.8 million cars travel this route monthly. Hopefully, at the end of the four-month program an estimated 40 million people will acquaint themselves with Northrop University. This type of public image building provides a springboard effect for future programming efforts of all department programs.

The Billboard was installed April 10th, so be on the lookout!

February 25, 1980

## What Is BUSINESS WEEK Saying About Northrop University?

In a major feature story, "The Trade-school Jump on Pay and Experience," internationally recognized business publication, **Business Week** featured Northrop University's 19-year-old Alexey Haussmann, an aviation mechanics student at Northrop's A&P School, as a prime example of current education trends throughout the country. As **Business Week** points out, there is a distinct trend of academically high-achievers in high school who are opting not to go on into the big four-year institutions. Rather, they are deciding to pursue academic training in the trade and technically oriented schools.

Alexey's perceptions are well founded in current industry trends where entry level positions for airline mechanics are \$18,000, according to David Bright, President of the National Education Corporation.

In an age of scarce education dollars more and more schools throughout the country are closing due to the declining enrollment in liberal arts programs. However, 1980 proves to provide Northrop with expanding enrollment statistics.

**Rebels Or Realists?** Other typical highcaliber students who are putting their faith in trade school rather than college include Lynn Marie Reeves, 19, who graduated from Broomfield (Colo.) High School with a 3.9 grade average and is studying fashion merchandising at Park College Inc. in Denver; Robert J. Abbot, 19, of Springfield, Pa., who turned down scholarships to three universities to study carpentry at Williamson Free School of Mechanical Trades in Media, Pa; and Alexey K. Haussman, 19, an aviation mechanics student at Northrop University, a Los Angeles

trade school who had a 3.5 grade average in high school in Torrance, Calif.

Their high school guidance counselors regarded them as rebels. But they, in turn, view their counselors as living in the past. "I think counselors still have that mentality that a trade school is a place for juvenile delinquents or students with learning disabilities," Haussmann says with a laugh. "I hear of PhDs working in travel agencies or experienced teachers making less than I will be when I graduate, and I don't think the counselors are living in reality." Haussman's optimism about starting wages seems well-founded. H. David Bright, president of National Education Corp. (NEC), which is the largest trade school operator, with some 70 schools and estimated annual revenues of \$80 million, claims that 90% of his schools' graduates are placed in jobs paying \$12,000 to \$18,000 annually.

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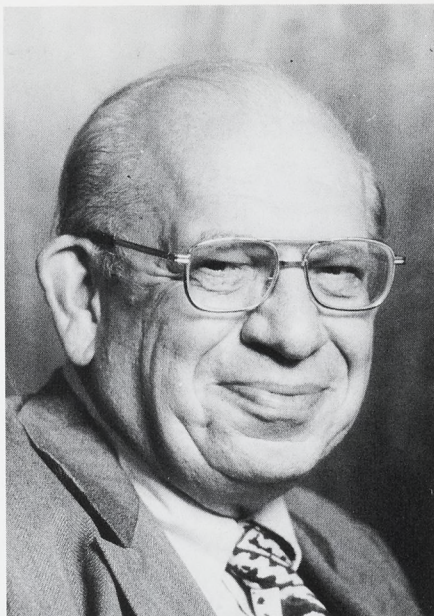
## APPOINTMENT OF DEAN OF ENGINEERING

Dr. Shell is pleased to announce the appointment of Dr. Everett T. Welmers as Dean of Engineering. Dr. Welmers received the unanimous recommendation of the Faculty Search Committee. Effective April 15, 1980 Dr. Welmers is available to work with the faculty, become acquainted with students, and contribute to the formulation of University policy on a consulting basis until his full-time instatement in September.

Dr. Welmers is currently Corporate Historian for the Aerospace Corporation where he is finishing the preparation of a 20 year history of the industry which will be issued in September.

The list of Dr. Welmer's accomplishments in education, as well as industry and research, is as broad as it is long. He is truly a "Renaissance Man", as well versed in the Classics as he is in the Sciences. He received his Ph.D. in Mathematics with a minor in Theoretical Astronomy from the University of Michigan in 1937. His undergraduate studies were divided among Latin, Greek, the Classics, and Mathematics.

In 1957, he was chosen Chairman of the Board of Bell Aircraft Corporation while at the same time serving as



Dr. Everett T. Welmers

Professional Lecturer at Millard Fillmore College, The University of Buffalo, teaching graduate courses in pure and applied mathematics. During his fourteen years with the University of Buffalo, he taught 57 graduate courses, and served on the Academic

Council of the University.

Dr. Welmers has also participated in a number of special study groups for the Department of Defense, including Project Lincoln, Project Starlight, and several summer studies on undersea warfare. From 1957 through 1968 he was a member of the Air Training Command Advisory Board.

Dr. Welmers is no stranger to the Northrop University community. He has been a member of the Engineering Advisory Committee for six years and is currently teaching "Vehicle Design." He was featured speaker at the Northrop's Commencement exercises in March when he spoke about the importance of imagination and innovation. "It is essential to have an active, creative imagination," he said, "but you also have to have the strength to put your ideas into action."

"To a large extent," he explains, "Engineering is an educational process, even when you are in the Aerospace industry. You have to be ready to explain information all the time. Not only that," he adds, "you must teach the students to dig for their own information. The essential attitude in a successful learning process is initiative."

## 'HANDS - ON' Training

SCROC, Southern California Regional Occupational Center, is fast becoming a model for a new type of education: the marriage of trade and high schools.

Superintendent Dr. Barton Welsh explained that the program's success was due to a new realization on the part of teachers, students and parents.

"Parents and students alike are beginning to realize that 85% of college students must work their way through college. What better way than at some highly skilled job which pays a liveable wage?"

One SCROC student worked his way through six years of college and law school with his skills in transmission repair.

Northrop University's Institute of Technology is one of SCROC's satellite programs which has 150 high school students who are transported daily from their high school for a three hour intensive training in Aircraft Maintenance.

Jack Loveless, Northrop University's high school recruiter and instructor for 15 years, explained that vocational education is not an alternative to an academic curriculum. "It is an extension of the academic program. We only accept students with a high academic rating in their junior year



Jack Loveless (left) discusses the future of SCROC with Superintendent Dr. Barton Welsh.

and we insist they finish high school or we drop them from the program."

The unique function of SCROC is that in a semester to a year, depending on the field of study, a student can acquire a job

entry skill. And with a reservoir of community employers over 4,000 strong calling daily for employees trained at SCROC facilities and its satellites, students can be assured a very high promise of employment upon graduation.



A MATTER OF GROWTH TO FILL A NEED

## The President's Circle

NORTHROP UNIVERSITY

The President's Circle consists of a select group of individuals who have demonstrated their interest in the perpetuation of higher education and have invested in the future of Northrop University.

Membership in the President's Circle provides a unique vehicle for the concerned citizen to take an active part in the future of our country and the world by assuming a vital role in the life of an emerging technical university dedicated to quality and relevant private higher education.

The University solicits the participation of members possessing a keen interest in the preservation of the free enterprise system combined with the understanding of the need to assist emerging nations to promote world peace through education.

Members of the President's Circle are ambassadors of the University, sharing the Northrop story with a larger audience and keeping the University aware of the opportunities for greater service to our nation and world.

### President's Circle Members Receive:

- Invitation to regional quarterly meetings with the President of the University to exchange views on national and international developments.
- A special certificate emblematic of membership
- Access to the University's Alumni Library and Pacific Technical Information Service in aviation and energy
- Complimentary copies of all Northrop University Press publications
- Invitation to all major campus events
- Personal Information and Important Document Locator

This booklet, when completed by you, will provide a complete reference to all your important documents and their location. In addition, it provides for the names of your executor, accountant, broker, doctor and rabbi or clergyman. This document locator will be invaluable to close family members and loved ones in the future.

Membership is open to alumni or by invitation to other individuals who make an annual tax-deductible donation of \$1,000 or more to the President's Development Fund of Northrop University. (Donations may be made in cash, stock or property. Membership is renewable annually.)

### PRESIDENT'S CIRCLE

I support the goals and objectives of Northrop University and the ideals of the free enterprise system.

☐ Enclosed is my check, in the amount of \$ \_\_\_\_\_  
for my Annual Membership in the President's Circle.

☐ Please contact me regarding a gift other than cash.

☐ Please contact me about other ways I may assist in the development of Northrop University.

Name \_\_\_\_\_

Address \_\_\_\_\_

City / State / Zip \_\_\_\_\_

Phone (\_\_\_\_\_) \_\_\_\_\_

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